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ESMA TRV Risk Analysis

Orderly Markets

The August 2022 surge in the price of natural gas futures

ESMA Report on Trends, Risks and Vulnerabilities Risk Analysis

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European Securities and Markets Authority (ESMA)
Economics, Financial Stability and Risk Department
201-203 Rue de Bercy
FR-75012 Paris
risk.analysis@esma.europa.eu
ESMA - 201-203 rue de Bercy - CS 80910 - 75589 Paris Cedex 12 - France - www.esma.europa.eu
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The August 2022 surge in the price of natural gas futures

Contact: damien.fennell@esma.europa.eu[1]

Summary

This paper investigates the record surge in prices on European natural gas markets in August 2022. It looks at the main market, the Dutch TTF, and finds CCP margins rose and fell with prices and volatility in line with expectations, with margin calls met on time.

There were no signs of reductions in positions in TTF contracts in our data, with TTF positions in fact slightly higher during this period. The OTC share also did not change significantly during the March and August 2022 market events. In terms of trading behaviour, it finds highly inelastic demand, reflected in only slightly lower traded volumes from a year previously, despite prices being many times higher. This was likely driven by the need to replenish reserves for the winter given the drop in Russian pipeline supply. End-clients in EU member states also accumulated net long positions through the month. At points in the month there was positive correlation between volumes and prices, indicative of demand rising with prices. Demand also focused primarily on futures for delivery in the autumn/winter period.

Different trading patterns are discernible among the largest end-clients. Some gas producers were significantly net short across maturities, showing their role in bringing supply to the market. Electricity utilities also showed two patterns, a first group who were long on maturities for winter delivery while short on others, and a second group that tended to build long positions across maturities, sometimes building positions rapidly, thus more liable to fuel price increases and reduce liquidity. Non-end clients, financial entities that act as clearing (and exchange) members, generally accumulated net short positions serving strong demand from end-clients.

[1] This article was written by Damien Fennell, Jordi Gutiérrez Curós, Martin Haferkorn, Martijn Lathouwers and Chloé Picandet.

Introduction

The February 2022 Russian invasion of Ukraine led to major geopolitical and market uncertainties, not least over the supply of Russian natural gas, and drove a sharp jump in natural gas prices in late February 2022. This compounded existing stresses in the natural gas market.[2] Later in 2022, a number of reductions in Russian pipeline gas supply resulted in a series of rapid price increases in European natural gas futures, culminating in **record prices** being reached in late August.

As set out in a recent ESMA risk analysis article,[3] the EU natural gas derivatives market has certain vulnerabilities. It is characterised by a high degree of concentration of market participants active in clearing and trading activity, and some energy firms hold relatively large derivative positions. As a result, there are vulnerabilities in terms of liquidity and concentration risks. Moreover, given the **high concentration** in the market, trading by large market participants can drive increased price volatility and reduced liquidity. In addition, there are also risks from data fragmentation and data gaps.

These vulnerabilities and the unprecedented price increases in natural gas derivatives markets, accompanied by illiquidity spikes, naturally raise questions as to whether the market functioned as intended during the summer 2022 period when prices surged to record levels. For instance, following the initial surge in prices in spring 2022, there were **calls for liquidity support measures** from industry and trade associations to be provided in the face of rapidly increasing initial margins and higher TTF prices triggering variation margin calls at the CCPs that clear exchange-traded natural gas futures. Concerns were cited on the particular impacts on energy producers with large hedging positions.[4] As prices rose, some governments provided support (through credit lines, loans and other measures) to firms reliant on natural gas, including in some cases for utilities using natural gas to generate electricity, as in Germany and Austria, where the fall in Russian supply had particularly strong impacts on certain firms.

To limit the potential for adverse impacts of extremely high natural gas prices on European households and business, there was a coordinated European policy response with the introduction of a '**market correction mechanism**' applicable from 15 February 2023. This introduced a 'dynamic bidding limit' on natural gas future prices, that would be triggered when (i) the Dutch TTF (and later other EU gas future contracts) front month price exceeded 180€/MWh and (ii) when the spread between it and a reference price (calculated by ACER and linked to the price of LNG) exceeded 35€/MWh.[5]

With this context, we look here at natural gas markets in summer 2022 to understand, within the limitations of our data, what may have been **potential drivers of the large and rapid increases in price**. There are three drivers of potential interest: market manipulation, higher CCP margins and a surge in demand where EU counterparties competed with one another to buy. Of these, we do not look at market manipulation[6] because the data we have are not well suited to make an assessment. On CCP margins, we provide a high-level overview of price, volatility, positions and margins. The available data gives insight into market developments during these market events but cannot be used to draw definitive conclusions on the relationship between margin levels and price formation.

Textbox 1

Summary of ACER's findings

Given the wide interest in the summer 2022 natural gas price surge, both ESMA and ACER agreed to publish analyses of the events of last summer, where ACER would focus on European gas wholesale market fundamentals and gas spot markets and ESMA on derivative markets, with both reports to be published at the same time.

ACER's analysis of EU gas markets[7] presents six primary conclusions on the gas market developments during the summer of 2022:

1. The disruption of Russian supply was the primary driver affecting EU gas prices.
2. EU gas consumption fell by over 50 billion cubic metres in 2022. However, additional demand in summer months,driven by larger storage injections and rising gas-fired power generation contributed to the record-high prices.
3. The implemented storage measures managed to attract substantial gas volumes ahead of winter

[2] These stresses can be seen in the European natural gas price surges in late 2021, namely in October and December 2021. See ACER 2023b for further discussion of the state of the natural gas market prior to the invasion.

[3] See ESMA 2022(b).

[4] See EACH, EFET, Eurelectric, Eurogas and Europex, 2022.

[5] For further information on the MCM, and an assessment of its initial impacts, see ESMA March 2023(a) and ACER 2023(a).

[6] Market manipulation is within the mandate of the relevant National Competent Authorities.

[7] The text in this box is adapted from the Executive Summary of ACER 2023(b).

2022/2023, but in some instances incurred high injection costs.

4. LNG played a crucial role in safeguarding EU gas supply, but costly spot LNG imports drove hub prices up. The rapid development of LNG infrastructure was overall effective.
5. The EU's integrated gas system demonstrated resilience. Yet, the severe supply shock led to highly congested access to LNG terminals and pipelines, causing price disparities and trading disruptions.
6. Hub trading volumes remained robust despite the surge in trading margins caused by the record-high prices. However, the trading environment was more challenging.

Approach and limitations

The analysis that follows is focused on the natural gas derivatives market and in particular the price surge observed in August 2022. Given the data available to us and ESMA's remit, our **focus is on EU natural gas derivatives and CCPs**. Developments in gas spot markets (including LNG vs pipeline gas provision) and electricity markets, while relevant, are not a central focus. Developments in these affect natural gas derivative prices by impacting supply and demand for natural gas derivatives and it is by focusing on the latter that we take these into account. In places, where relevant we touch on these other drivers.[8]

The analysis is also specifically focused on the **Dutch natural gas futures market (TTF)** as this is the largest and most liquid EU natural gas market and a reasonable proxy for the European gas futures market as a whole. As these TTF contracts are exchange-traded, we supplement this with a brief discussion of the OTC market, and specifically the extent to which higher prices may have driven a shift to OTC, such as to forward contracts, during the price surge. [9]

Our **primary focus is on the month of August 2022**, the period when the record price was reached, with a view to assess potential drivers of prices then, rather than focusing over a longer period. In places, particularly the trading analysis, we also compare August 2022 with August 2021, using the latter as a benchmark period that is comparable to August 2022, except for the exceptional developments related to the invasion.[10]

The analysis also attempts to distinguish between **end-clients**, who are at the end of the wholesale chain of purchases, such as electricity utilities, gas distributors, and gas producers, and non-end clients who act as intermediaries. Given limits in data, the split is done by treating CCPs and clearing members as 'non-end clients' and other firms as end-clients. This approach is not perfect in that some non-end clients will act as intermediaries and some non-end clients that act as clearing and exchange members will also engage in some trading on their own account. However, when complemented by knowledge about the firm's activities, it helps to identify the overarching patterns of demand and supply of physical natural gas to European counterparties using futures. Discussion of counterparties is also anonymised to ensure confidentiality.

The analysis we present makes use of EMIR trading activity and trade state data and uses data gathered by ESMA from CCPs. There are several important limitations relating to the **EMIR data** used. First, as EMIR data is only reported where at least one counterparty is domiciled in the EEA, much of the analysis that follows is based on a partial sample of counterparties in the market because it does not include trades that involve two non-EEA counterparties, for example, those between a UK-domiciled exchange member and a US counterparty. Second, the trade activity data we use is that of the net daily position (either 'long', where the participant enters into a contract to purchase gas or 'short', where the participant enters into a contract to supply gas) reached between two counterparties, [11] as it is more reliable than reported intraday data. However,

[8] For a more comprehensive overview on developments in natural gas spot markets and developments in LNG, please see ACER 2023(b).

[9] Under EMIR, OTC covers derivatives that are not exchange-traded, that is, those not executed in a regulated market or third-country equivalent. As such, OTC derivatives under EMIR include derivatives traded in venues such as OTFs and MTFs which are not considered as regulated markets. In addition, there are some derivative transactions that are not reported under EMIR, such as wholesale energy products traded on an OTF that must be physically settled, that are not classified as financial instruments as per Annex I Section C(6) of MiFID II, see ESMA 2023(c). As a result, transactions in those instruments are not reported under any financial regulation in ESMA's remit and so do not figure in analyses presented here.

[10] Since august 2021 is also before the TTF price surges observed in October and December 2021, it avoids these late 2021 price surges affecting the comparison.

[11] In the analysis that follows we analyse in terms of net positions i.e. whether the accumulated positions in a contract with a given maturity commits the counterparty in aggregate to sell (net short) or buy (net long) natural gas when contracts mature.

this limits the granularity of the analysis and so we do not analyse how intraday trading activity correlates with intraday price, volatility and liquidity which is likely to have been significant at points. Third, we do not have order flow data which would allow us to look at the bids placed and agreed. This also puts important limitations on the ability to assess drivers of price.

We here predominantly analyse volumes in megawatt hours (MWh) rather than in notional amounts. This is done to factor out the significant price effect on notional amounts, whereby notional amounts increase as a function of increasing price. It also allows one to analyse the market in terms of the underlying quantities of natural gas to be exchanged. The volumes of MWh presented are for the total amount to be delivered through the contract. We also calculate a first delivery month for contracts based on the reported maturity date and use this to present splits of contracts by when delivery of gas is expected to start. [12]

In the firm-level analysis of trade activity data, it is not possible to identify trading strategies or more broadly infer intent. It is also difficult to classify the firms into neat categories. While some attempt is made to do this in simple terms to build a high-level narrative, it is limited by the fact that larger firms, including those most active in the derivatives market, can be involved in a range of activities (e.g. trading activities, electricity generation, storage, distribution etc.). Similarly, analysis at country-level, which here is based on firm domicile, is also challenging because larger firms are often active across jurisdictions and their domicile does not always reflect the main locus of their economic interests. Also for this reason, we refrain from making strong country claims.

Finally, the margin analysis uses CCP and EMIR data and there are several limitations in usage of this data. Firstly, the data shows margins at the level of clearing members (mostly financial counterparties) but lacks information on the level of clients and NFCs. Secondly, data is not granular enough to distinguish the exact impact on TTF based derivatives as netting is applied across different products.

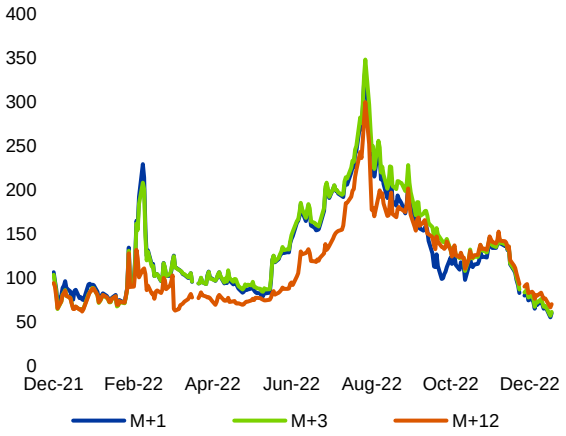
The summer 2022 price surge

This section presents our analysis of natural gas derivative markets over summer 2022, looking at general market patterns of price, volatility and liquidity, before looking at CCP margins and OTC patterns, before finishing with a short trading analysis over August 2022 based on EMIR data.

Higher volatility and lower liquidity

European natural gas **prices spiked in early spring 2022** following the Russian invasion (Chart 1). This was followed by a few months of relatively lower and more stable prices. However, signs of longer-term reductions in Russian gas supply drove further price increases later in 2022. Developments such as Russia halting supplies to Poland and Bulgaria in April and cuts to the Nord stream 1 pipeline supply in June made increasingly clear the unreliability of current and future natural gas supplies from Russia. This fed expectations of a more persistent fall in Russian gas supply, eventually culminating in record price rises in August.

Chart 1
European natural gas futures prices (Dutch TTF)
Surges in February and August 2022



Note: Average close price observed on ICE and EEX for selected TTF monthly contracts, in EUR.
Sources: Refinitiv EIKON, ESMA.

The August price surge was also during the yearly period of increased demand, when winter

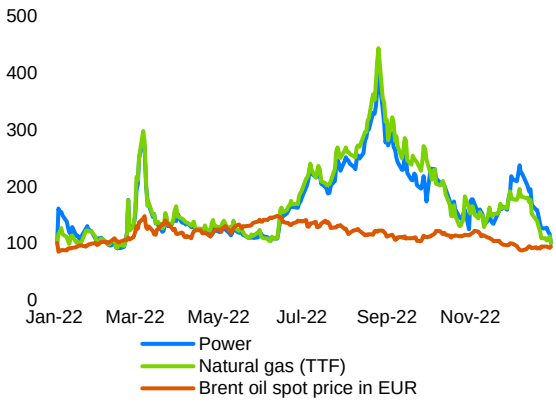
[12] With natural gas futures, which typically take the form of contracts with delivery periods of a month, quarterly, half-year or year, this means that all-else being equal MWh amounts for contracts that deliver over longer periods will be proportionately higher than those with shorter periods. However, because these have not been identified in our data, we refrain from presenting TTF futures in terms of the length of the delivery period, and instead present splits by when delivery is estimated to start. This implies, however, that delivery periods listed in charts below, such as January to February, can include a mix of futures contracts with different delivery periods ranging from yearly, half-yearly, quarterly, monthly.

gas supplies are secured and natural gas reserves refilled. Gas demand was also increased due to relatively low pre-summer storage levels.[13] Later in August, prices fell back down but nonetheless remained at a relatively high level until December 2022.

Also of note is that in March, prices of contracts maturing in the near-term (up to 6 months) were mostly impacted, whereas in August price increases were also very significant for longer-term contracts (over 12 months), as shown in the chart above. This reflects how concerns were more extensive and also focused on the longer-term supply of gas.

In addition, the **August price event was mostly confined to the EU power and gas market** but did not impact other energy commodities, again indicating a more substantial change in expectations for this market in particular. (Chart 2)

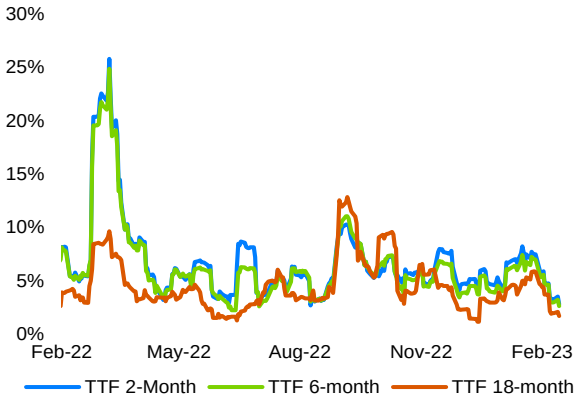
Chart 2
Power, natural gas and oil prices
Power and gas surge, unlike oil price



Note: Commodity price indices rebased at 1/1/2022=100. ICE Dutch TTF futures for natural gas, EEX Phelix futures for power, Brent spot price converted to EUR.
Sources: Refinitiv EIKON, Datastream, Thomson Reuters, ECB, ESMA.

However, while the August price changes were **unprecedented in absolute terms they were not in terms of price volatility**. As a result of the already high initial price level, relative shocks were actually significantly lower than in March, as shown in the chart below (Chart 3).

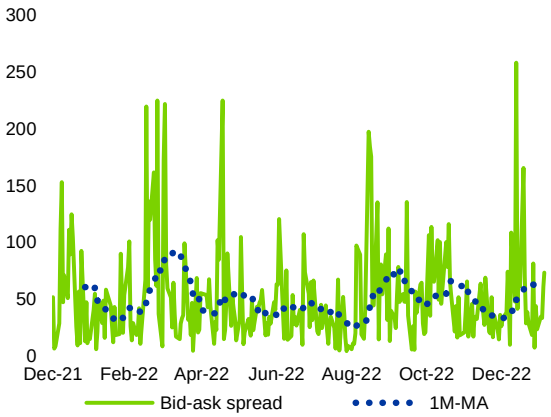
Chart 3
TTF price return volatility for 2, 6 and 18-month
Volatility increase greater in March than August



Note: Standard deviation of 1-day price returns for ICE Endex TTF monthly energy futures with maturities in 2, 6 and 18 months, over a 10-day rolling period
Sources: Refinitiv EIKON, ESMA.

Similar patterns are clear also for liquidity, where metrics in August were again not unprecedented. In particular, bid-ask spreads show similar levels in the second half of August 2022, as reported in March and December 2022 (Chart 4). Although it should be remembered that spreads are relative to higher absolute prices.

Chart 4
Bid-ask spread liquidity measure (Dutch TTF)
Drop in liquidity in February and August 2022



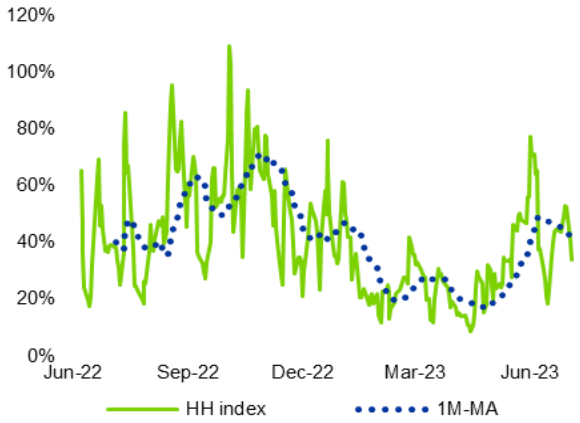
Note: Bid-ask spread of the front-month TTF natural gas future traded on ICE, in bps, computed using bid and ask close prices. 1M-MA=one-month moving average.
Sources: Refinitiv EIKON, ESMA.

Another important liquidity metric, the Hui-Heubel market liquidity ratio, also shows a lower level of

[13] See section 2.3.1, ACER 2023(b).

available orders and market resilience in August, though it also shows that levels of market liquidity reduced more in the following 3 months (Chart 5).

Chart 5
Dutch TTF liquidity Hui-Heubel ratio
Drop in liquidity in late summer and autumn



Note: Hui-Heubel liquidity ratio for ICE Endex TTF front-month contract, and one-month moving average. Higher values indicate less liqudity.
Sources: Refinitiv EIKON, ESMA.

In conclusion, despite the record prices in August, we do not see correspondingly extreme volatility or illiquidity during the summer period. Taken together, these indicators suggest that **TTF markets continued to function appropriately** during the August market events.

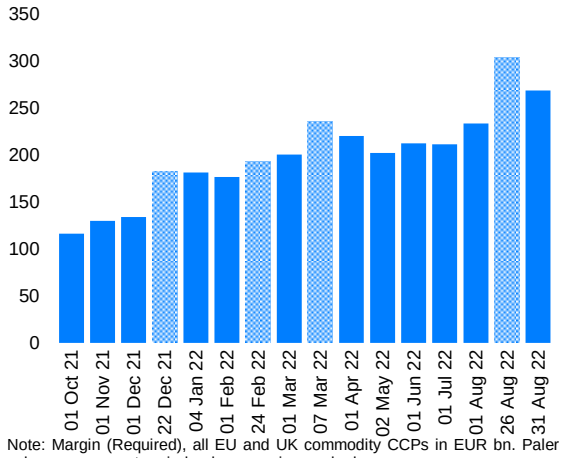
Increased funding due to higher margins

TTF futures are mostly traded on exchange traded markets, where central counterparties (ICEU & ECC) provide a performance guarantee through a set of the financial resources including initial margins. **CCPs offer substantial benefits** as they protect against the default of a participant, enable anonymous trading, increasing market liquidity and transparency. By reducing risk exposure, they can also help to reduce the cost of meeting capital requirements.

However, a CCP can only provide these benefits if relevant risks are covered through high-quality collateral. Levels of required collateral can increase substantially under stressed market conditions leading to increased liquidity needs and potentially procyclical effects.[14]

During the March and August price events we can see that the **higher price levels and volatility were also incorporated in the TTF margin** calculation and particularly the margin rate that is applied to net TTF outright positions (Chart 6).

Chart 6
Margins required all EU and UK commodities CCPs
Margins responded to price and volatility



Note: Margin (Required), all EU and UK commodity CCPs in EUR bn. Paler columns represent periods when margins peaked.
Sources: Margin data submitted by EU and TC CCPs, ESMA.

In March, the TTF outright margin rates mostly increased for front-end maturities (1 month to 6 month), whereas after the August price event maturities beyond 1-year maturity were particularly impacted.[15] Initial margins posted at commodities CCPs also increased by approximately 30% from the start of the month to 26 August 2022. On this day, the largest 1-day margin increase was recorded, 11% for all commodities CCPs.

Overall, the price and volatility increases resulted in an important peak in CCP margin requirements at the end of August, with a subsequent reduction in margin levels. However, margins remained at elevated levels in the months that followed. In sum, our evidence suggests CCP margins rose/fell in line with prices and volatility, as would be expected for this type of market event.

No reduction in TTF positions and on-exchange activity

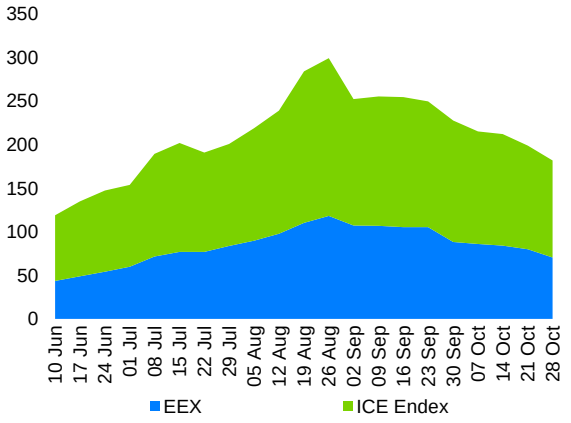
The increased prices in August 2022 resulted in higher TTF position values. Looking at EMIR data shows the TTF positions at relevant CCPs that

[14] A further question that could be asked is whether market liquidity was directly affected during the August price event, as was discussed in some media reports, for example, by Wilkes and Tunstead 2022.

[15] Some of this effect is likely to due to the fact that from the autumn onwards some six-month contracts are rolled-over to one-year contracts (maturing the following winter).

are held by EU clearing members and EU clients (regardless of whether clearing with an EU or non-EU clearing member). In this data, we can see that the outstanding notional amounts for EMIR natural gas futures positions increased to a peak of approximately EUR 300bn, in line with the higher market prices at the time (Chart 7). The chart also shows higher relative changes for positions held at the UK-based ICE Clear Europe (ICEU) compared to those held at the German-based European Commodity Clearing (ECC).[16]

Chart 7
Cleared natural gas futures positions
Grew and later fell with prices

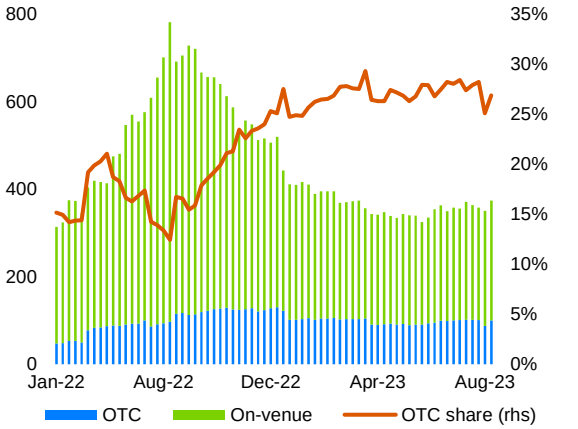


Note: Outstanding notional amounts in natural gas futures, cleared and excluding intragroup, executed at ICE Endex (MIC: NDEX) and EEX (MICs XEER, XPOW and XPSF) in EUR bn.
Sources: TRs, ESMA.

EMIR TTF position values later quickly dropped due to lower prices but nonetheless remained at higher levels than was recorded at the end of July. Nonetheless, there is **no evidence of a reduction in cleared TTF positions** before or directly after August 2022 price events. [17]

In addition, the OTC vs ETD share remained stable during August and only increased in the following months mainly because of a reduction in ETD, while **OTC positions remained stable**. If we look at the period before the Russian invasion, that is before February 2022, a limited share of outstanding notional amount of gas was executed OTC (c.15%). Later in the year, the OTC rate increased, in April and May to 20%. However, the trend of higher OTC rates in outstanding notional amounts did not persist, and actually decreased after May 2022 as TTF prices increased (Chart 8).

Chart 8
OTC share outstanding in natural gas derivatives
OTC share did not increase in August



Note: Outstanding notional amounts (EUR bn) on gas derivatives, by on-venue/OTC. All sectors included, intragroup trades excluded.
Sources: EMIR, ESMA

A driver of the increase in the OTC rate for outstanding notional amounts is the fact that OTC contracts tend to have longer maturities and thus slower turnover than ETD contracts. As a result, the OTC rate will tend to rise after price rises, because the OTC notional amounts experience the increase in the price effect more slowly than ETD amounts which will drive up the OTC share.

A peak in (nominal) weekly trading flows was also noted during August 2022. However, the OTC share in the trading flows, as measured using EMIR data, remained stable. Only in September 2022, after the price spike, did the weekly OTC share rise substantially and the exchange flows decrease. These dynamics were reflected in the higher OTC share in TTF positions in the last quarter of 2022 (Chart 9).

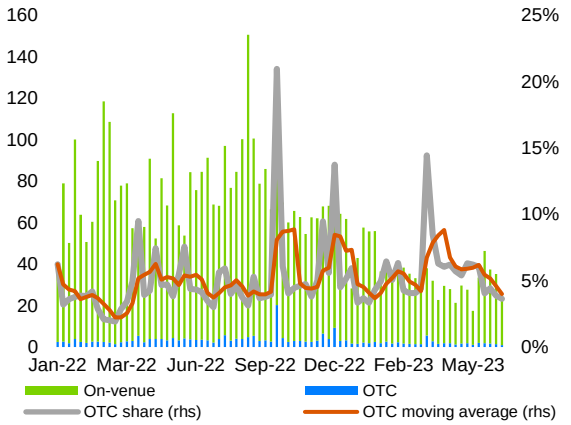
The higher margins could have been associated with lower on-exchange trading activity (and resulting market liquidity) [18] because this form of execution is more costly and has greater liquidity needs to hold positions at the CCP. And clearly, market participants did experience a difficult market environment during the August market events. As an example, several market participants faced unprecedented margins calls that were closely linked with higher market prices. There is anecdotal evidence that market

[16] ICEU provides clearing services for ICE ENDEX, and ECC provides clearing services for the European Energy Exchange AG.

[18] See Brunnermeier and Pedersen 2009.

participants contacted authorities to request funding so as to maintain hedges in energy products.

Chart 9
OTC share in trading flows in natural gas derivatives
OTC share of flows did not grow in August



Note: Notional amounts (EUR bn) traded on gas derivatives, by on-venue/OTC. All sectors included, intragroup trades excluded. OTC share displayed on a weekly basis and as a monthly moving average.
Sources: EMIR, ESMA

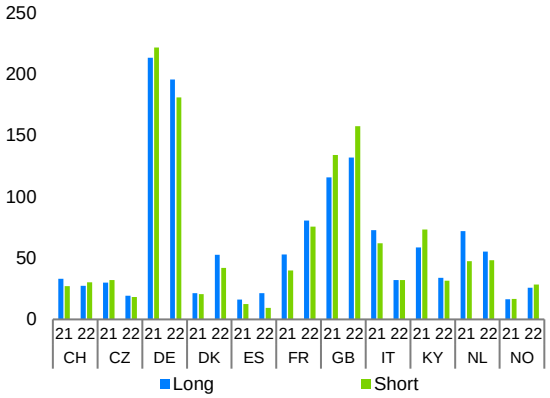
Nonetheless from the EMIR data investigated, there is **no evidence of a reduction in ETD positions during the August market events,** nor that price formation was impacted. A similar but less pronounced pattern was noted during the March price event. A potential explanation for the continuous high level of activity could be that exchange traded markets (enabled by CCPs) provide for a more liquid exit point and higher price transparency during a market crisis event than OTC trading. That being said, there is strong evidence of reduced ETD positions and increased OTC share in the following months that could potentially be linked to increased margin requirements on TTF contracts. The burden linked to initial margin calls can lead to some market participants either reducing trading activities or moving these OTC.

August 2022: exceptionally strong European demand for TTF futures

In this section we use EMIR data to investigate demand for natural gas. A first observation here is that despite much higher prices, natural gas traded **volumes on exchanges in August 2022 were only slightly lower than in August 2021**. In particular, TTF futures volumes involving end-clients in MWh were only 7% down compared to the same month a year earlier, while the average price was over five times higher in 2022 than in 2021.[19] The moderate fall in volumes relative to the extreme price increase shows just how inelastic the demand was from European end-clients, and underlying this, the strength of the needs to secure natural gas.

Looking at the accumulated long and short positions traded to end-clients for the ten countries with the largest such volumes in August 2022 (Chart 10), we see a **relatively limited decrease in volumes across most countries**, in both long and short activity, compared to a year earlier. However, there are exceptions, GB, FR, DK and NO show increases in both long and short volumes. Country attributions here, however, are based on counterparty domicile which may not always align with where economic interests lie.

Chart 10
Long and short volumes in August 2021 vs 2022
Distinctive long-short pattern in 2022



Note: Natural gas volumes bought and sold in August 2021 and 2022 by end clients domiciled in countries that are among those with the top 10 amounts bought or sold by end clients in August 2022. 21 - August 2021, 22 - August 2022. MWh in millions. Two-letter ISO country code.
Sources: Refinitiv, ISO, TRs, ESMA.

Nonetheless, as the switch away from Russian gas impacted certain member states more than others, it is unsurprising to see some country-specific differences in the natural gas traded in August 2022 as compared to a year earlier. German end-clients, for example, shifted to being net sellers of gas futures in August 2021 to net buyers in August 2022, which may in part reflect the significant role Russian gas played in German supply before the invasion, and the resulting greater need for German end-clients to build up reserves in August 2022 as compared to a year earlier.

[19] Based on their REMIT data, ACER find a 14% year-on-year fall in volumes for final gas consumption for 2022 and small falls in TTF trading volumes (which also include OTC) over the summer, see sections 2.2 and 2.6.2 in ACER 2023(b).

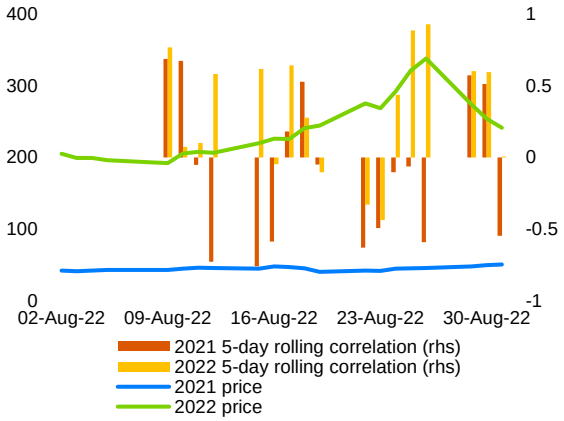
Looking at long and short volumes on a day-by-day basis, a couple of interesting patterns emerge. First, on most days the volume traded long over the day exceeds that traded short. And, given EMIR reporting is biased towards European firms (as it does not have reports from trades without a European counterparty), the excess long over short is roughly indicative of **European demand exceeding European supply among end-clients** through the month.

Another indirect sign of strong demand, and its role in driving prices up in August 2022, can be seen in how in 2022, but not in 2021, volumes in the month often trended upwards with price. In particular, in August 2022, there is a positive correlation between daily TTF futures volumes traded by end-clients and the TTF price, 0.35, as compared to -0.32 over August 2021 (Chart 11).

Chart 11

Prices and correlations with volumes, 2022 vs 2021

Positive correlation through much of August 2022



Note: TTF front month price in August 2021 and 2022, and 5-day rolling correlation between price and daily end-client volumes. 2021 values are for the corresponding working day in August 2021.
Sources: EIKON Refinitiv, TRs, ESMA.

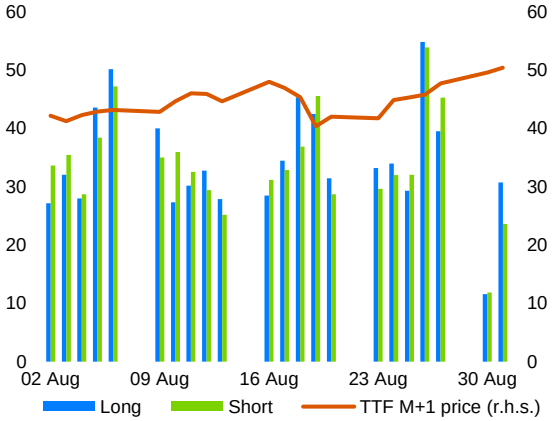
Moreover, the correlation of price and volumes was particularly positive during the week of August 23rd when prices surged dramatically. The sharp increase in price-volume correlation through the week of the 23rd, **shows the strong demand-side momentum** at that point in time, indicative of a strong willingness (in the aggregate) to keep buying in spite of rising prices, in turn indicative of short-term expectations of continuing limited supply and continuing rising prices.

More broadly, **patterns were different in 2021.** In August that year there were no signs of volumes trending with prices, both visually or as measured by correlations, and long daily volumes to end-clients do not consistently exceed short volumes (Chart 12).

Chart 12

TTF daily long and short positions for end-clients 2021

Higher volumes, little sign of bias to long or short

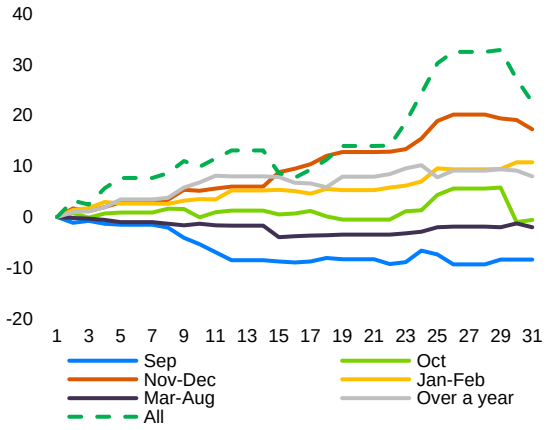


Note: Long and short TTF futures volumes traded by end clients in August 2021, MWh in millions. 1 Month TTF price EUR per MWh.
Sources: Refinitiv, TRs, ESMA.

Returning to August 2022, looking at the split by maturities is also informative (Chart 13). This shows that during August 2022, most net long positions were accumulated in futures contracts with deliveries starting in November and December months, followed by those beginning delivery in January and February, indicating that demand was **focused on securing deliveries for the upcoming winte**r. Also interesting is that net long position increased across maturities during the period of the week starting August 23rd when prices surged.

The accumulation of net-short positions for near-term delivery (September) and post-winter (March to August) suggests that European counterparties may have been shifting demand away from immediate and later maturities towards those needed to cover winter needs. However, an important caveat here is that our data does not include spot trades not executed on derivative markets, so the picture is necessarily partial.

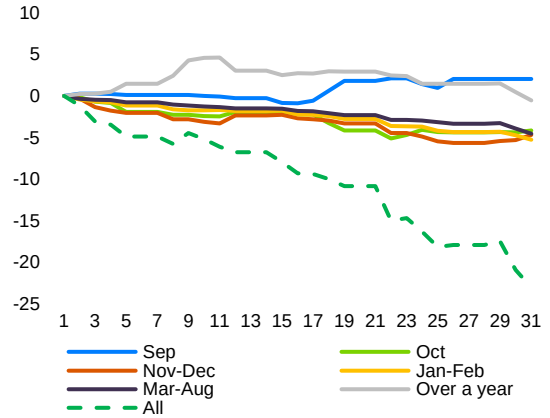
Chart 13
Accumulated net positions by maturity in August 2022
Demand focused on maturities covering winter



Note: Total net long / short positions accumulated in TTF futures through August 2022 by period of first delivery month, in MWh millions. Net long is positive, net short is negative.
Sources: EIKON Refinitiv, TRs, ESMA.

The EMIR data also enables one to look at counterparty level, to assess patterns of trading that may have had an impact on price. Looking at the **end-clients with the largest accumulated net positions over August 2022**, several different patterns emerge.

Chart 14
Accumulated net positions by maturity in August 2022
Natural gas producer: short in most maturities

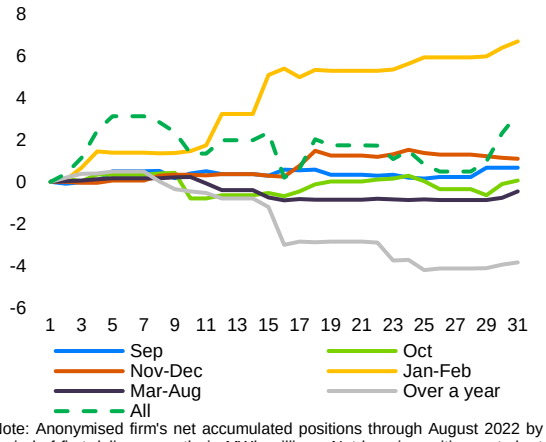


Note: Anonymised firm's net accumulated positions through August 2022 by period of first delivery month, in MWh millions. Net long is positive, net short is negative.
Sources: EIKON Refinitiv, TRs, ESMA.

Among the largest firms, there are several major **natural-gas-producing firms**. One accumulated net short positions across most maturities (Chart 14). A second built-up long positions particularly in contracts delivering from October, while building short positions in contracts delivering in January and February. Both of these firms traded in a gradual way, with little sign of step changes in accumulated MWh across different maturities. In contrast, a third firm was notable for entering into a very large short position in contracts towards the end of August delivering in October, potentially a supply injection that may have helped to ease price pressures.

Among **firms generating electricity**, there are a couple of patterns discernible. Among some, there is a pattern of building up long positions in maturities covering the winter months, while going short on earlier maturities (September or October delivery) or longer maturities (March or later delivery). These firms, by trading gradually and going long in some maturities while short in others, appear to exhibit a hedged trading behaviour that builds up winter supplies while releasing supply for other periods (Chart 15). In doing this, the upward price pressure from these firms is likely to have been moderated.

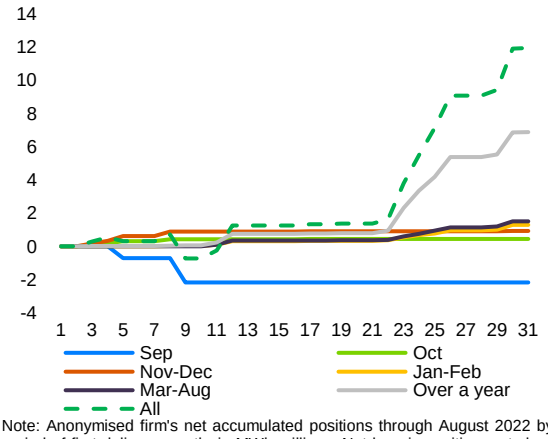
Chart 15
Accumulated net positions by maturity in August 2022
Electricity utility type 1: long on winter maturities



Note: Anonymised firm's net accumulated positions through August 2022 by period of first delivery month, in MWh millions. Net long is positive, net short is negative.
Sources: EIKON Refinitiv, TRs, ESMA.

A second pattern among electricity utility firms is also visible, in which firms built up long positions across maturities, sometimes with major step increases, indicative of large long positions being entered into, often at points when the price was surging (Chart 16), in particular during the week of August 23rd. These actions are more likely to have impacted price and strained liquidity.

Chart 16
Accumulated net positions by maturity in August 2022
Electricity utility type 2: long on most maturities

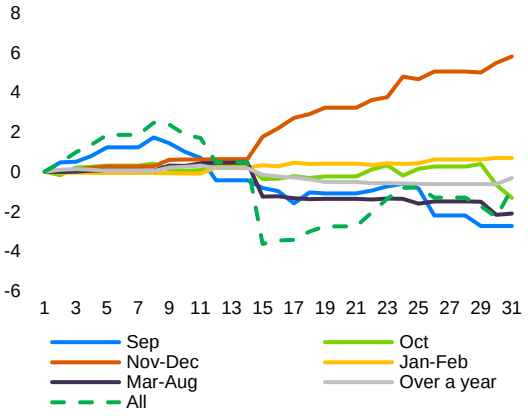


Note: Anonymised firm's net accumulated positions through August 2022 by period of first delivery month, in MWh millions. Net long is positive, net short is negative.
Sources: EIKON Refinitiv, TRs, ESMA.

The specific drivers of the trading behaviour by firms generating electricity are unclear, though there are several likely potential contributors. Credit lines and other forms of support are likely to have helped firms continue to enter into long contracts despite rising prices, and as presented in a recent ECB report,[20] increases in public support rose with prices. In addition, electricity prices also rose similarly rapidly with gas prices and for some it would have been profitable to enter into long gas contracts, while entering into short contracts to supply electricity.[21]

In addition to these firms, there are also **hedge funds** among the end-clients with the largest accumulated net positions over August. To illustrate the difference from other end-clients, the firm in the chart below (Chart 17) started by going long in the shortest maturity over the first half of the month, before moving short in the middle of the month in the post-winter maturity. In the second half of the month, it gradually built up a long position in early winter delivery months and went increasingly short in the shortest maturity contracts and those for delivery after winter. Overall, it switched from a net long to a net short position in the middle of the month which it reduced at month-end. The picture here is varied and difficult to interpret in isolation, perhaps reflective of complex trading strategies of firms not constrained by needs to fill reserves.

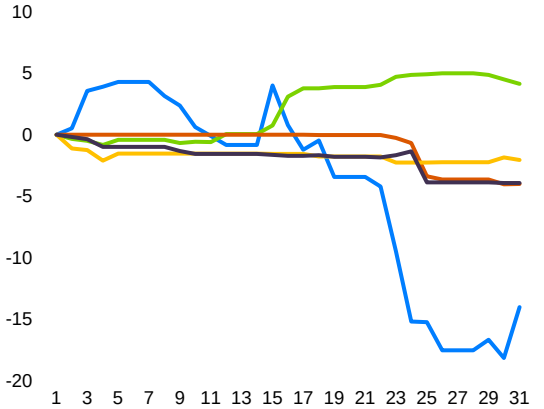
Chart 17
Accumulated net positions by maturity in August 2022
Hedge fund: net long then short



Note: Anonymised firm net accumulated positions through August 2022 by period of first delivery month, in MWh millions. Net long is positive, net short is negative.
Sources: EIKON Refinitiv, TRs, ESMA.

Lastly, we briefly look at **non-end clients, generally banks** that act as exchange members, clearing members and market makers. Looking at the accumulated net positions of these counterparties over August 2022 shows that these were generally net short through the month (Chart 18).

Chart 18
Accumulated net positions by maturity in August 2022
Non-end-clients – most net short by month end



Note: Cumulative net positions for TTF futures for non-end clients with five largest net accumulations over August 2022, MWh in millions, long positive, short negative.
Sources: Refinitiv, TRs. ESMA.

[20] See Figure A.7a, p.104, ECB Financial Stability Report November 2022.

[21] As set out in section 2.2.2. in ACER 2023(b) the interplay of power capacity constraints, gas plants competing with coal and hydro to set power marginal prices and hedging aspects prompted a rise in power prices relatively higher than gas prices, which made gas-fired power generators' margins very high, causing a surge in gas consumption for power generation in various Member States.

We also see step falls around Aug 23rd for three non-end clients in the 10 largest clients, showing the accumulation of more short positions that mirror the step long accumulations of some end-clients at the same time. This is as expected, given most of the end-client positions will be with non-end client counterparties.

Conclusions

To conclude, this analysis of events of August 2022 in natural gas derivative markets has found:

— **Prices surged in 2022**, first in late February/March and later with record peak prices in August 2022, with reduced impact on TTF futures liquidity and volatility in August 2022 compared to March 2022.

— **CCP margins rose and fell with prices and volatility in line with expectations**. CCP margin calls were met on time. Several public support measures were taken, but after the August price peak.

— **There are no signs of reductions in positions in TTF contracts** in our data for August and September 2022. TTF positions were actually slightly higher during this period.

— **The OTC share did not significantly change during March and August 2022:** while increases in OTC share could in theory have arisen from higher margin requirements, only in September 2022, after prices fell back, did the OTC share grow markedly.

— **Volumes in August 2022 were only slightly down from August 2021** despite much higher prices; showing the inelasticity of demand with pressures to secure winter deliveries and fill reserves.

— **Positive correlation between end-client volumes and prices** shows demand grew even as prices surged.

— **EU-domiciled end clients generally accumulated long positions over August** unlike in 2021, with demand focused on maturities before and in winter.

— **The big gas producers in our data were net sellers** across most maturities over the month, indicative of their role in bringing supply to the market.

— **Electricity utilities that were among the most active firms showed two main patterns** over August, a first group buying maturities for the winter delivery while selling others, a second group accumulated long positions across maturities, sometimes in large jumps.

— **The price surge appears driven by strong demand among EU end-clients** and the need to secure winter reserves, in the context of the fall in Russian supply.

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